ENGINEERING

Continuous Liquid-Liquid Extraction of Lomustine Synthesis

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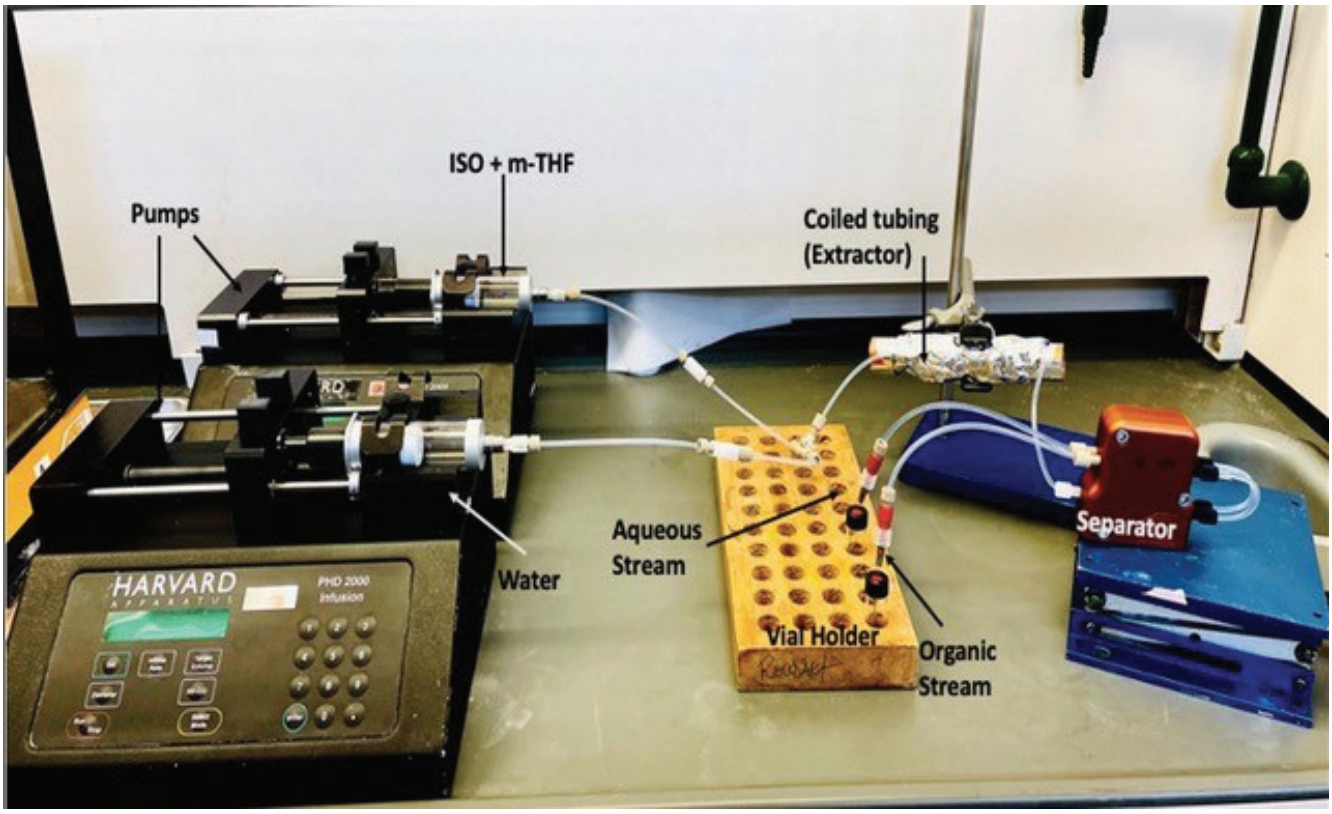
Lomustine, which is a chemotherapy drug that treats Hodgkin's lymphoma and brain tumors, had a price increase of 1,400% in 2014. The increased price raised concerns that the potentially lifesaving drug may not be prescribed to patients. The objective of this project is to develop a new end-to-end manufacturing process that enables the in-house manufacturing of Lomustine. The poster aims to determine key process parameters for a liquid-liquid extraction unit operation. The hypothesis for the unit operation is that a minimum impurity profile can be achieved in the organic phase of continuous-flow liquid-liquid extraction by varying critical process parameters. This profile was determined by implementing solvent selection, designing a conducive design of experiments, and analyzing the experimental results with high-pressure liquid chromatography. The process was repeated and edited to accommodate learnings through the experiments conducted. Partition coefficient calculated experimentally showed the best value at 0.36. The percentage of extraction of impurities was also calculated at 82%, which showcased a clear decrease in the impurity of the main process stream. The researchers anticipate that with a purer product stream, the manufacturing process will have less byproduct formation.

Research advisor Zoltan K. Nagy writes: "Here at Purdue, we bring design and innovation together with the aim to construct a continuous, modular, small-scale manufacturing platform for pharmaceuticals. Ms. Grover has a lead role in the development for one of our purification units for an anticancer medication. Her work is critical to enable the manufacturing of this medicine with the desired purity."



Experimental setup for the continuous liquid-liquid extraction.

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